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(71) Applicant: MAGNETI MARELLI S.p.A.
I-20145 Milano (IT)

(72) Inventors:
• Carnevale, Claudio
I-10076 Nole Canavese (IT)
• Coin, Davide
I-10159 Torino (IT)

• Marica, Stefano
I-10127 Torino (IT)
• Serra, Gabriele
I-40068 S. Lazzaro di Savena (IT)
• Sgatti, Stefano
I-40026 Imola (IT)

(74) Representative: Plebani, Rinaldo et al
c/o Studio Torta,
Via Viotti 9
10121 Torino (IT)

(54) Electronic gas concentration control system

(57) An electronic concentration control system in which a first exhaust gas composition sensor (16) located in an exhaust pipe (9) downstream from a catalytic converter (11) is connected to an input to a P.I. circuit (28) which generates a control output signal (K02) comprising a succession of opposing triangular ramps. The system includes a second exhaust gas composition sensor (14) located in the exhaust pipe (9) upstream from the catalytic converter (11) generating a signal which is fed to a proportional integral circuit (30) whose integrating and multiplying coefficients (K_i , K_p) are altered on the basis of the control signal (K02).

The system includes a diagnostic circuit (50) which checks the efficiency of the first and second sensors (16, 14).

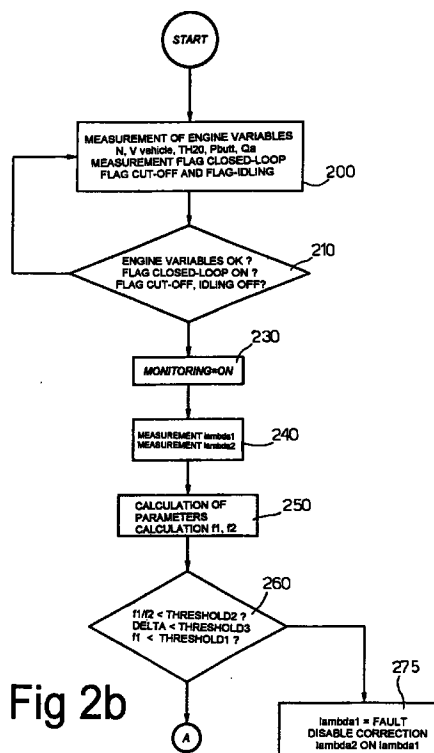
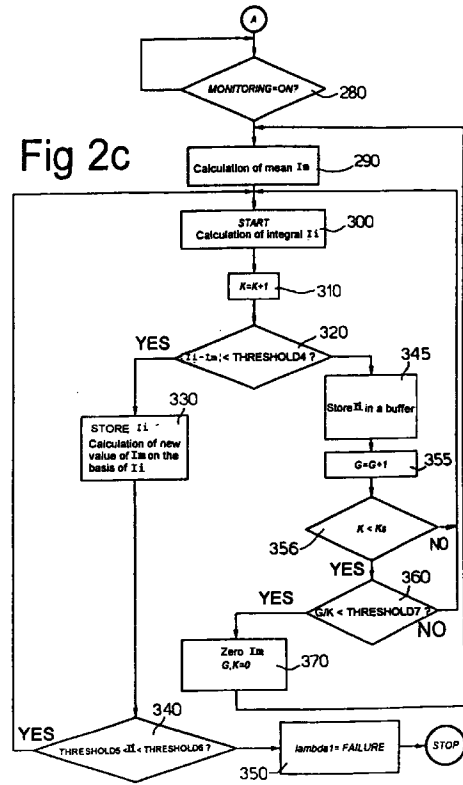


Fig 2b

EP 0 694 685 A3

Fig 2c





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EUROPEAN SEARCH REPORT

Application Number
EP 95 11 1275

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	US-A-5 134 847 (OGAWA ET AL.) 4 August 1992	1,2	F02D41/14
Y	* column 5, line 6 - column 8, line 32 *	6-10	
X	PATENT ABSTRACTS OF JAPAN vol. 17, no. 572 (M-1497), 18 October 1993 & JP-A-05 163984 (MAZDA MOTOR CORP.), 29 June 1993, * abstract *	1-4	
X	DE-A-43 31 153 (VOLKSWAGEN AG.) 31 March 1994	1,2	
A	* the whole document *	3-5	
Y	US-A-5 095 878 (KUMAGAI ET AL.) 17 March 1992	6-10	
A	* column 8, line 36 - line 60 * * column 14, line 44 - column 16, line 42 *	11	TECHNICAL FIELDS SEARCHED (Int.Cl.6) F02D
P,X	US-A-5 337 555 (TOKUDA ET AL.) 16 August 1994 * the whole document *	1-4	
A	DE-A-43 06 055 (SUZUKI MOTOR CORP.) 16 September 1993 * page 5, line 9 - line 28 * * page 11, line 30 - line 55; claims *	6-11	
A	US-A-4 831 838 (NAGAI ET AL.) 23 May 1989 * column 3, line 39 - column 4, line 19 * * column 10, line 59 - column 12, line 24; claims *	6-11	
A	EP-A-0 595 586 (FORD MOTOR CO.,LTD.) 4 May 1994 * column 5, line 8 - column 6, line 28 *	6-11	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 7 June 1996	Examiner Moualed, R
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ All claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claims:
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions, namely:

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- ☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☐ None of the further search fees has been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:



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EP 95111275.4-B-

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions, namely:

Subject 1: Claims 1-5: Air-fuel regulation system comprising 2 exhaust sensors up and down stream of a catalytic converter, characterised by diagnostic means for the upstream sensor using the switching frequencies of both sensors.

Subject 2: Claims 1, 6-16: Air-fuel regulation system comprising 2 exhaust sensors up and down stream of a catalytic converter, with diagnostic means for the upstream sensor characterised by means to correlate the control signal based on the upstream sensor, on the polarity of the control signal of the downstream sensor.